U.S. Nuclear Regulatory Commission

Site-Specific RO Written Examination

Applicant Information	
Name:	
Date: 12/15/15	Facility/Unit: Brunswick / Unit 1 & 2
Region: I ☐ II ☑ III ☐ IV ☐	Reactor Type: W ☐ CE ☐ BW ☐ GE ☑
Start Time:	Finish Time:

Instructions

Use the answer sheets provided to document your answers. Staple this cover sheet on top of the answer sheets. To pass the examination, you must achieve a final grade of at least 80.00 percent. Examination papers will be collected 6 hours after the examination begins.

Applicant Certification

All work done on this examination is my own. I have neither given nor received aid.

_____
Applicant's Signature

Results	
Examination Value	75 Points
Applicant's Score	_____ Points
Applicant's Grade	_____ Percent

Brunswick 2015 NRC RO Answer Key

#	ID	Answers 0
1	201001 1	C
2	201002 1	~~D~~ C | BJC 1-7-16
3	201003 1	B
4	203000 1	A
5	204000 1	B
6	205000 1	D
7	205000 2	C
8	206000 1	C
9	209001 1	D
10	211000 1	C
11	212000 1	D
12	215002 1	A
13	215003 1	A
14	215004 1	A
15	215005 1	C
16	217000 1	B
17	218000 1	A
18	218000 2	B
19	219000 1	B
20	223002 1	C
21	223002 2	A
22	233000 1	D
23	239002 1	A
24	241000 1	A
25	256000 1	D
26	259002 1	A
27	261000 1	B
28	262001 1	B
29	262002 1	A
30	262002 2	B
31	263000 1	A
32	264000 1	B
33	264000 2	D
34	271000 1	C
35	290002 1	D
36	290003 1	D
37	295001 1	C
38	295003 1	B
39	295004 1	A
40	295005 1	C
41	295006 1	B
42	295007 1	A
43	295008 1	D
44	295010 1	A
45	295014 1	D
46	295016 1	B
47	295017 1	C
48	295018 1	B
49	295019 1	C

		Answers
#	ID	0
50	295020 1	D
51	295021 1	B
52	295023 1	D
53	295024 1	C
54	295025 2	B
55	295026 1	B
56	295028 1	C
57	295030 1	C
58	295031 1	C
59	295037 1	C
60	295038 1	C
61	300000 1	C
62	400000 1	B
63	500000 1	A
64	600000 1	C
65	700000 1	B
66	CONDUCT OF OPERATION 1	A
67	CONDUCT OF OPERATION 2	C
68	EMERGENCY PROCEDURE 1	A
69	EMERGENCY PROCEDURE 2	C
70	EQUIPMENT CONTROL 1	D
71	EQUIPMENT CONTROL 2	D
72	EQUIPMENT CONTROL 3	C
73	RADIATION CONTROL 1	A
74	RADIATION CONTROL 2	B
~~75~~	~~RADIATION CONTROL 4~~	~~D~~ Deleted | BJC 1-7-16

1. Which one of the following completes the statement below?

   With Unit One operating at rated power, on a loss of air to 1-C11-F002A(B), CRD Flow Control Valve, the valve will fail __(1)__, causing __(2)__ cooling water to the CRD Mechanism.

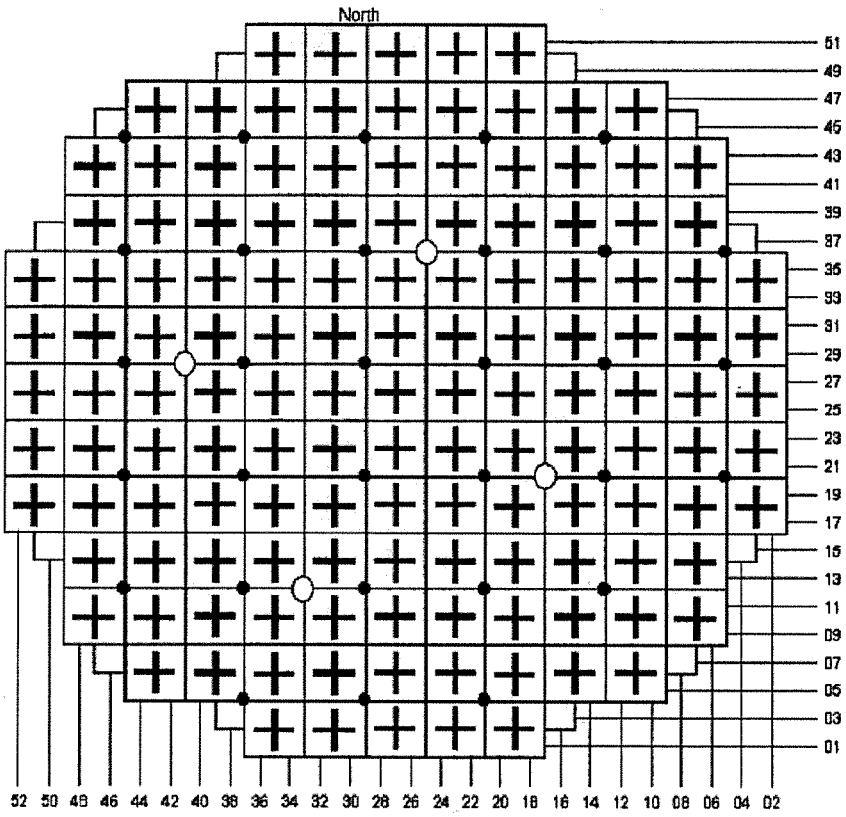
   A. (1) open
      (2) minimum

   B. (1) open
      (2) maximum

   C. (1) closed
      (2) minimum

   D. (1) closed
      (2) maximum

2. During a startup on Unit Two, control rod 30-39 is desired to be moved continuously from 12 to 48.



Which one of the following completes both statements below?

The minimum number of RMCS control switches needed to accomplish this control rod movement is __(1)__.

During this control rod movement the largest power change will be seen on SRM __(2)__.

A. (1) one
   (2) B

B. (1) one
   (2) C

C. (1) two
   (2) B

D. (1) two
   (2) C

3. During a reactor startup on Unit Two, a control rod at position 24 is difficult to move.

Which one of the following completes both statements below?

IAW 2OP-07, Reactor Manual Control System Operating Procedure, Drive Header DP is required to be adjusted by throttling __(2)__ C12-PCV-F003, Drive Pressure Valve.

If the control rod cannot be moved from postion 24, LCO 3.1.1, Shutdown Margin (SDM) __(1)__ met.

A. (1) open
   (2) is

B. (1) closed
   (2) is

C. (1) open
   (2) is NOT

D. (1) closed
   (2) is NOT

4. RHR has auto initiated and is no longer needed for Reactor water level control.

   Which one of the following identifies the required sequence for resetting a Core Spray initiation signal IAW 1OP-17, Residual Heat Removal System Operating Procedure, Section 7.1, Shutdown-Auto or Manual LPCI Mode?

   A. Reset both Divisions of Core Spray logic, then reset both Divisions of LPCI logic within 10 seconds.

   B. Reset both Divisions of LPCI logic, then reset both Divisions of Core Spray logic within 10 seconds.

   C. Reset Division I Core Spray Logic then Division I LPCI Logic within 10 seconds, and then reset Division II Core Spray Logic then Division II LPCI Logic within 10 seconds.

   D. Reset Division I LPCI Logic then Division I Core Spray Logic within 10 seconds, and then reset Division II LPCI Logic then Division II Core Spray Logic within 10 seconds.

5. Following a reactor scram on Unit One, a reject flow path to the condenser has been established to control reactor water level.

   Subsequently, the following conditions exist:

Reactor water level	198 inches
RWCU Diff flow	35 gpm
RWCU System discharge pressure	130 psig
RWCU room temperature	125°F
RWCU Pump flow	80 gpm
RWCU Filter Inlet Temperature	139°F

   Based on these conditions, which one of the following completes both statements below?

   The RWCU Pump(s) will __(1)__.

   The 1-G31-F001, RWCU Inlet Inboard Isolation Valve, will __(2)__.

A. (1) trip
   (2) close

B. (1) trip
   (2) remain open

C. (1) continue to run
   (2) close

D. (1) continue to run
   (2) remain open

6. Unit Two is in MODE 4. Both loops of RHR are in Shutdown Cooling mode when an inadvertent Group 8 isolation signal is received.

   IAW 0AOP-15.0, Loss of Shutdown Cooling, which one of the following completes both statements below?

   The minimum required reactor water level, unless otherwise directed by the CRS, is __(1)__.

   Recirc loop suction temperatures __(2)__ be used for vessel coolant temperature monitoring for indications of boiling.

   A. (1) 192 inches
      (2) can

   B. (1) 192 inches
      (2) can NOT

   C. (1) 200 inches
      (2) can

   D. (1) 200 inches
      (2) can NOT

7. Unit Two is in MODE 3 with RHR Loop A in Shutdown Cooling IAW 2OP-17, Section 5.7, Placing First RHR Loop in Shutdown Cooling Mode. RHR Pump 2A is running and RHR Pump 2C is in standby. A small leak results in the following conditions:

RPV water level	176 inches
RPV pressure	40 psig
Drywell pressure	1.9 psig

Which one of the following predicts how RHR Loop A will respond?

A. Group 8 isolation; RHR Pump 2A trips.

B. RHR Pump 2C auto starts; RHR Loop A cooldown rate rises.

C. RHR Pump 2C auto starts; RHR Loop A decay heat removal is lost.

D. RHR Pump 2A remains running; RHR Pump 2C remains off.

8. Unit Two HPCI is operating in pressure control mode. Reactor pressure band is 800-1000 psig. Current plant conditions are as follows:

Reactor pressure	990 psig, rising
HPCI flow controller	Auto
HPCI flow	3500 gpm
HPCI turbine speed	3700 RPM
HPCI controller output	80%

Which one of the following identifies two methods available to maintain Reactor pressure in band?

Throttle HPCI Bypass to the CST, E41-F008, in the __(1)__ direction, or __(2)__ the HPCI flow controller auto setpoint.

A. (1) open
   (2) raise

B. (1) open
   (2) lower

C. (1) closed
   (2) raise

D. (1) closed
   (2) lower

9. With Unit One in Mode 3, a steam line rupture occurs in the Drywell. Plant conditions are:

Drywell pressure	18 psig
Reactor water level	60 inches
Reactor pressure	350 psig

Which one of the following completes both statements below?

The Core Spray System injection valves are __(1)__.

The shutoff head of the Core Spray pumps is approximately __(2)__ psig.

A. (1) closed
(2) 200

B. (1) closed
(2) 300

C. (1) open
(2) 200

D. (1) open
(2) 300

10. An ATWS has occurred on Unit Two. Terminate and prevent actions have been completed.

Which one of the following completes both statements below IAW 0OI-37.5, ATWS Procedure Basis Document?

With SLC Tank level at 30%, __(1)__ Shutdown Boron Weight has been injected into the Reactor.

At this time, raising reactor water level __(2)__ required to ensure the reactor will remain shut down.

A. (1) Cold
   (2) is

B. (1) Cold
   (2) is NOT

C. (1) Hot
   (2) is

D. (1) Hot
   (2) is NOT

11. A Unit Two APRM ODA shows the following indications:

Which one of the following completes both statements below?

The cause of the indications for APRM 2 is a __(1)__.

As a result of this condition, Voter input status lights will show an APRM UPSC/INOP trip on __(2)__.

A. (1) Recirculation pump trip
   (2) Voter 2 **ONLY**

B. (1) Recirculation pump trip
   (2) all 4 Voters

C. (1) Recirculation flow unit failed downscale
   (2) Voter 2 **ONLY**

D. (1) Recirculation flow unit failed downscale
   (2) all 4 Voters

12. Which one of the following is the power supply to APRM Channel 4 NUMAC on P608?

A. 120 VAC RPS

B. 120 VAC UPS

C. 24/48 VDC Div I

D. 24/48 VDC Div II

13. Which one of the following distribution systems identifies the power supply to the Intermediate Range Monitor (IRM) channels?

A. 24/48 VDC

B. 125/250 VDC

C. 120 VAC UPS

D. 120 VAC RPS

Note: This question is asking about the IRM circuitry. It is NOT referring to drive mechanism or recorders

B/C
12-15-15

14. A plant startup is in progress. A control rod block has occurred. The following nuclear instrument indications are noted:

SRM	Counts	Position
A	$3x10^5$	Full In
B	$5x10^4$	Partially Withdrawn
C	$6x10^4$	Full In
D	$5x10^4$	Partially Withdrawn

IRM	Counts	Range
A	25/125	3
B	65/125	2
C	35/125	3
D	15/125	3
E	50/125	2
F	55/125	2
G	30/125	3
H	25/125	3

Which one of the following is the minimum required action(s) that will clear the control rod block?

A. Withdrawing SRM A ONLY.

B. Withdrawing SRM A and C.

C. Ranging IRM E to range 3.

D. Inserting SRM B and D.

15. A reactor startup is being performed on Unit Two. Reactor power is currently 18%. APRM Channels 1 and 2 have the following number of operable LPRM inputs:

Level	A	B	C	D
APRM 1	5	3	4	4
APRM 2	6	4	2	5

Which one of the following identifies the effect on the Reactor Manual Control System (RMCS), if any?

A. Rod Block. APRM 1 **ONLY** is INOPERABLE.

B. Rod Block. APRM 2 **ONLY** is INOPERABLE.

C. Rod Block. **BOTH** APRM 1 **AND** 2 are INOPERABLE.

D. No Rod Block. **BOTH** APRM 1 **AND** 2 are OPERABLE.

16. Which one of the following identifies two RCIC functions that remain available following a loss of 125 VDC Panel 4A on Unit Two?

A. automatic initiation and inboard isolation logic

B. automatic initiation and outboard isolation logic

C. automatic shutdown on high RPV water level and inboard isolation logic

D. automatic shutdown on high RPV water level and outboard Isolation logic

17. An automatic ADS actuation has occurred.

Which one of the following completes both statements concerning A-03 (1-10) *Safety / Relief Valve Open?*

This alarm is activated by __(1)__ .

After the reactor is automatically depressurized, the amber light for all the affected SRVs __(2)__ be illuminated on the apron section of RTGB Panel P601.

A. (1) a SRV sonic detector
   (2) will

B. (1) a SRV sonic detector
   (2) will NOT

C. (1) B2l-TR-6l4, Safety Relief Vlv Temp recorder
   (2) will

D. (1) B2l-TR-6l4, Safety Relief Vlv Temp recorder
   (2) will NOT

18. Which one of the following completes both statements below concerning the 125 VDC power supply to the Unit One ADS logic?

The normal power supply is from Distribution Panel __(1)__,

The backup power supply is from Distribution Panel __(2)__.

A. (1) 3A
   (2) 3B

B. (1) 3B
   (2) 3A

C. (1) 3A
   (2) 4A

D. (1) 3B
   (2) 4B

19. Unit Two is operating at rated power.

In preparation for a HPCI surveillance, RHR Loop 2B has been placed in Torus Cooling IAW 2OP-17, Section 5.9, Suppression Pool Cooling Mode, with all pumps running and cooling maximized.

A subsequent transient occurs with the following plant conditions:

Drywell Pressure	18.1 psig
Torus Pressure	13.7 psig
Reactor Pressure	20 psig
Reactor water level	100 inches

Which one of the following completes both statements below?

Procedurally, total RHR Loop B Torus Cooling flow is limited to __(1)__ .

Immediately after the transient, Torus Cooling __(2)__ remain in service.

A. (1) 11,500 gpm
(2) will

B. (1) 11,500 gpm
(2) will NOT

C. (1) 17,000 gpm
(2) will

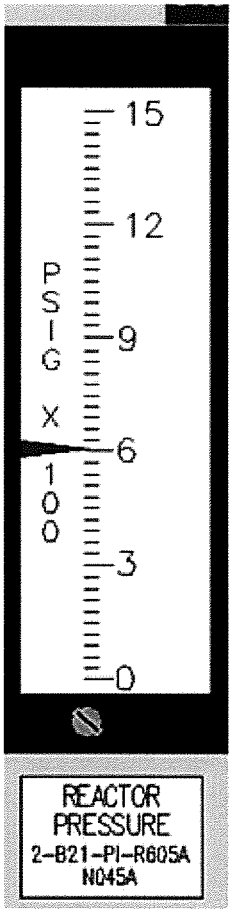
D. (1) 17,000 gpm
(2) will NOT

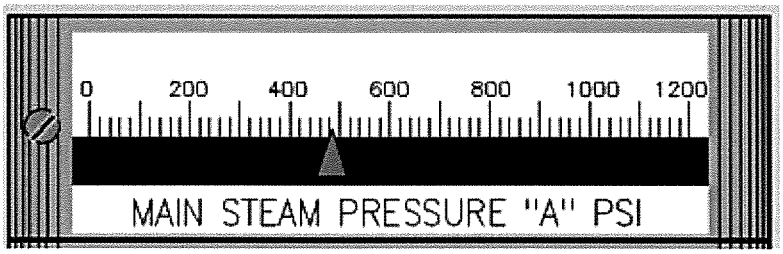
20. Unit Two Mode Switch is in Startup with reactor pressure at 600 psig.

Which one of the following completes both statements below?

High steam flow sensed in a minimum of __(1)__ steam lines will cause **ALL** the Group 1 Isolation valves to close.

If a Group 1 isolation occurs, the MSIVs __(2)__ be opened for a rapid recovery of the Main Condenser, IAW 2OP-25, Reopening the MSIVs Following a Scram, given the following indications:





A. (1) 2
(2) may

B. (1) 2
(2) may NOT

C. (1) 4
(2) may

D. (1) 4
(2) may NOT

21. Reactor Recirc pumps have auto tripped due to low Reactor water level.

At time = 0, the following indications are available:
G31-F001, RWCU Inboard Isol Vlv, is Closed
G31-F004, RWCU Outboard Isol Vlv, is Open

Which one of the following identifies what the GROUP 3 ISOL CMND status box on ERFIS will display at time = five minutes?

A. A green GROUP ISOL

B. A red NO GROUP ISOL

C. A yellow GROUP ISOL CMND

D. A green NO GROUP ISOL CMND

22. 2OP-17, Section 8.11, Fuel Pool Cooling Assist Mode with Fuel Pool Gates Removed, is being performed on Unit Two.

Which one of the following identifies the power supplies required for the RHR pumps that are utilized in this procedure section?

A. E1 and E2

B. E3 and E4

C. E1 and E3

D. E2 and E4

23. Which one of the following completes both statements below?

The SRVs discharge at approximately __(1)__ in the torus.

The __(2)__ provides even heat distribution in the suppression pool.

A. (1) -8 feet
   (2) T-Quencher

B. (1) -8 feet
   (2) Ring Vent Header Deflector

C. (1) -6.5 feet
   (2) T-Quencher

D. (1) -6.5 feet
   (2) Ring Vent Header Deflector

24. Unit Two is operating at 20% power during a plant startup.
2 Bypass Valves are open with the Main Turbine being rolled (currently at 500 RPM).

A complete loss of Uninterruptible Power Supply occurs.

Which one of the following identifies the plant response?

A. Reactor scram on high reactor pressure signal.

B. Reactor scram on turbine valve closure signal.

C. No reactor scram. Turbine valves close.

D. No reactor scram. Turbine roll continues with EHC transferred to the PMG power supply.

25. Unit Two is operating at 45% power when UA-04 (1-9) *FW Heater Level High Extr Trip* alarms for the 5A Feedwater Heater.

Which one of the following completes both statements below?

2-EX-V23, Non-Return Valve to Feedwater Heater 5A, will __(1)__.

2-HD-LV-83-2, FW Heater 5A Emergency Drain Valve, will route water to the __(2)__.

A. (1) open
   (2) condenser

B. (1) open
   (2) deaerator

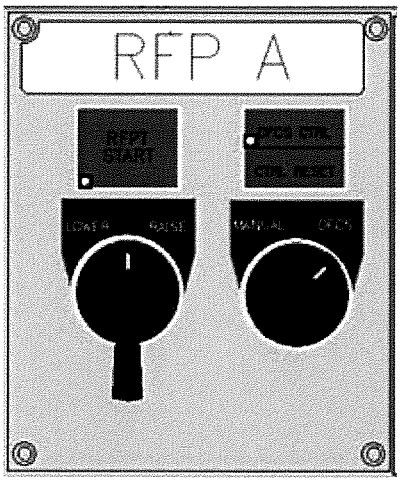
C. (1) close
   (2) condenser

D. (1) close
   (2) deaerator

26. Unit Two is operating at 40% power. Reactor Feed Pump (RFP) 2A is operating in automatic DFCS control when the following alarm is received:

UA-13 (6-5) *RFP A Control Trouble*

The RO observes the following indications for RFPT 2A on XU-1:



(all light indications are extinguished)

Which one of the following identifies how RFP 2A will respond and what actions are required to control RFP 2A under this condition?

RFP 2A will __(1)__.

The RO can manually control RFP 2A, IAW 0AOP-23, Condensate/Feedwater System Failure, by using the LOWER/RAISE __(2)__.

A. (1) remain at the current speed
   (2) Speed Control Switch on XU-1.

B. (1) remain at the current speed
   (2) Speed Demand pushbuttons at RFP 2A panel display station on P603.

C. (1) automatically lower to 1000 RPM
   (2) Speed Control Switch on XU-1.

D. (1) automatically lower to 1000 RPM
   (2) Speed Demand pushbuttons at RFP 2A panel display station on P603.

27. Unit Two is operating at rated power when a Group 1 Isolation occurs. The following plant conditions currently exist:

Reactor pressure	850 psig
Reactor water level	110 inches, HPCI/RCIC auto injecting
Drywell pressure	1 psig
Torus pressure	1.1 psig

Which one of the following predicts how the plant is affected if both SBGTs subsequently trip?

A. HPCI/RICI unavailable for injection.

B. High airborne activity on the -17' elevation.

C. Torus-to Drywell Vacuum breaker operation will occur.

D. Rx Bldg-to-Torus Vacuum breaker operation will occur.

28. Unit Two is shutdown with all switchyard PCBs closed except for generator PCBs 29A and 29B, which are open. A fault occurs on Line 31 (Whiteville) with a failure of PCB 31B to open.

Which one of the following is the expected status of 230 KV Bus 2B and the SAT?

A. 230 KV Bus 2B is energized; SAT is energized.

B. 230 KV Bus 2B is de-energized; SAT is energized.

C. 230 KV Bus 2B is energized; SAT is de-energized.

D. 230 KV Bus 2B is de-energized; SAT is de-energized.

29. During a Station Blackout with DG3 ONLY available, 4KV Emergency Buses cannot be cross-tied. On Unit One, DC voltage is 210 VDC and slowly lowering due to loss of battery chargers.

Which one of the following completes both statements below?

The Unit One Primary UPS inverter DC input breaker, CB 101, __(1)__ tripped.

IAW 1EOP-01-SBO, Station Blackout, MCC-1CA can be energized using __(2)__.

A. (1) is
(2) SAMA DG2

B. (1) is
(2) Cross-Tie E7 to E5

C. (1) is NOT
(2) SAMA DG2

D. (1) is NOT
(2) Cross-Tie E7 to E5

30. The indications and status of the Unit Two UPS system at the primary and standby inverters are as follows:

	Primary Inverter	Standby Inverter
Load on UPS light	Off	Off
Load on Inverter light	Off	On
Load on Alternate light	On	Off
Alt Source Failure light	Off	Off
Manual Bypass switch	Norm	Bypass Test

Which one of the following identifies the current status of UPS system loads?

A. Energized from MCC 2CA

B. Energized from MCC 2CB

C. Energized from 2E7

D. Energized from 2E8

31. Which one of the following completes both statements below regarding 125/250 VDC Station Distribution?

During a float charge, the charger output voltage to the battery will be at a __(1)__ voltage than when in the equalize mode.

Each division of the 125/250 VDC Station batteries are capable of supplying 150 amps for __(2)__ hours.

A. (1) lower
(2) 8

B. (1) lower
(2) 10

C. (1) higher
(2) 8

D. (1) higher
(2) 10

32. A dual unit Loss of Offsite Power has occurred and DG4 has tripped on differential overcurrent.

Which one of the following loads will lose power as the result of the trip of DG4?

A. RHR Pump 2D

B. RWCU Pump 2B

C. Fuel Pool Cooling Pump 2A

D. Conventional Service Water Pump 2C

33. DG1 was running in Control Room Manual for the performance of 0PT-12.2A, No. 1 Diesel Generator Monthly Load Test, and loaded to 2100 KW.

Subsequently off-site power was lost.

Which one of the following completes the statements below after the system has stabilized?

The DG1 governor is currently in __(1)__ mode of operation.

DG1 frequency is slightly __(2)__ 60 Hz.

A. (1) droop
   (2) less than

B. (1) droop
   (2) greater than

C. (1) isochronous
   (2) less than

D. (1) isochronous
   (2) greater than

34. The crew is placing the AOG System in service IAW 2OP-33, Section 6.1.1, AOG Charcoal Adsorber System Startup.
HCV-102, AOG System Bypass Valve, control switch on XU-80 is placed in AUTO, with the local control switch in the CLOSED position.
AOG-CS-3161, AOG Sys Vlv Cont Sel Sw, is in CENT position.

Subsequently, UA-45 (2-2) *Discharge H2 Conc High* alarms.

Which one of the following completes the statement below.

The HCV-102, AOG System Bypass Valve, __(1)__, and the XCV-142, AOG Guard Bed Isolation Valve __(2)__.

A. (1) auto opens
(2) auto closes

B. (1) auto opens
(2) remains open

C. (1) remains closed
(2) auto closes

D. (1) remains closed
(2) remains open

35. A second Recirc Pump startup is being performed on Unit One IAW 1OP-02, Section 6.1.2, Reactor Recirculation Pump Startup.

Which one of the following completes the statements below concerning the bottom head coolant temperature and the reactor pressure vessel (RPV) coolant temperature?

The maximum temperature difference is limited to __(1)__ .

These temperature limitations are required to be determined within no more than __(2)__ prior to startup of an idle recirculation loop, IAW 2OP-02, Reactor Recirculation System.

A. (1) $\leq$ 50°F
   (2) 15 minutes

B. (1) $\leq$ 50°F
   (2) 30 minutes

C. (1) $\leq$ 145°F
   (2) 15 minutes

D. (1) $\leq$ 145°F
   (2) 30 minutes

36. Which one of the following Unit One time-critical actions is required to be performed within 30 minutes, IAW 1-EOP-01-SBO, Station Blackout Procedure?

A. Load strip the batteries.

B. Cooldown to 150-300 psig.

C. Open Reactor Building roof hatch.

D. Open the Control Room panel doors.

37. Unit One is operating at 94% power with OPRMs Inoperable, when Recirculation Pump 1A trips.

The following conditions exist:

Total Core Flow (P603)	32.2 Mlbm/hr
Total Core Flow (U1CPWTCF)	33.9 Mlbm/hr
APRMs:	44%

Which one of the following completes both statements below?

The OPRM Inoperable, __(1)__ Operation Power to Flow map is required to be used to determine the current operating point.

The current operating point is in the __(2)__ Region.

(Reference provided)

A. (1) Single Loop
   (2) 5% Buffer

B. (1) Single Loop
   (2) Immediate Exit

C. (1) Two Loop
   (2) 5% Buffer

D. (1) Two Loop
   (2) Immediate Exit

38. Unit Two is operating at 84% power.
Reactor Recirculation Pump 2A & 2B speeds are 74%.
VFD 2A power cell failure and automatic cell bypass have occurred.

Subsequently the following alarms/indications are observed:
UA-17 (4-4), *SUB E7 XFMR SEC BKR TRIP*
A-06 (3-2), *RECIRC FLOW A LIMIT*

Which one of the following completes both statements below?

Reactor Recirculation Pump A has runback to Limiter __(1)__.

In order to raise Recirc Pump A speed the __(2)__ must be reset.

A. (1) #1
(2) runback signal ONLY

B. (1) #1
(2) runback and speed hold signals

C. (1) #2
(2) runback signal ONLY

D. (1) #2
(2) runback and speed hold signals

39. UA-23 (3-8) *250 VDC Battery B Ground* alarm is received and sealed in on Unit Two. An AO reports the following readings:

N Bus	1.1 ma
PN Bus	0.4 ma
P Bus	2.7 ma

Which one of the following completes both statements below?

The ground is located on the __(1)__ Bus.

IAW 0AI-115, 125/250 VDC System Ground Correction Guidelines, when ground resistance is between __(2)__, then plant procedures should be entered to locate and correct the ground condition.

A. (1) N
   (2) 15 and 25 Kohms

B. (1) N
   (2) 26 and 35 Kohms

C. (1) P
   (2) 15 and 25 Kohms

D. (1) P
   (2) 26 and 35 Kohms

40. Unit One is operating at rated power with DG1 running loaded for a monthly load test. A fault trips the Main Generator Primary Lockout relay.

BOP Bus 1C fails to transfer due to failure of its associated SAT supply breaker to close.

Which one of the following completes both statements below?

E1 is energized from __(1)__.

Entry into 0AOP-36.1, Loss of Any 4160V Buses or 480V E-Buses, __(2)__ required.

A. (1) DG1 ONLY; off-site power is available
   (2) is

B. (1) DG1 ONLY; off-site power is available
   (2) is NOT

C. (1) off-site power with DG1 running unloaded
   (2) is

D. (1) off-site power with DG1 running unloaded
   (2) is NOT

41. Following a loss of the Uninterruptible Power Supply on Unit One, a reactor scram occurs from 100% power.

Which one of the following completes both statements below?

Reactor power __(1)__ be determined to be below 2%.

The reactor __(2)__ be determined to be S/D Without Boron under <u>all</u> conditions.

A. (1) can
   (2) can

B. (1) can
   (2) can NOT

C. (1) can NOT
   (2) can

D. (1) can NOT
   (2) can NOT

42. Unit One was operating at rated power.
MSIV closure results in RPV pressure peaking at 1135 psig.
The reactor failed to scram.
The recirculation pumps are running with reactor power at 5%.

Which one of the following completes both statements below?

__(1)__ Safety Relief Valves have auto opened.

The operator __2__ required to trip the recirculation pumps.

A. (1) 4
(2) is

B. (1) 4
(2) is NOT

C. (1) 8
(2) is

D. (1) 8
(2) is NOT

43. Which one of the following completes both statements below?

IAW the Immediate Operator Actions in 0AOP-23.0, Condensate/Feedwater System Failure, IF reactor vessel level approaches __(1)__, THEN trip one reactor feed pump.

This condition could lead to __(2)__.

A. (1) 200 inches
   (2) jet pump vibration

B. (1) 200 inches
   (2) erosion wear of turbine blades

C. (1) 206 inches
   (2) jet pump vibration

D. (1) 206 inches
   (2) erosion wear of turbine blades

44. Following a line break in the drywell, Unit One conditions are:

Drywell pressure	6 psig
Drywell temperature	225°F
Torus pressure	7 psig
Torus level	-27 inches

Which one of the following completes both statements below?

The Suppression Chamber to Drywell Vacuum relief valves are __(1)__.

PCCP directs initiation of __(2)__ under the given conditions.

A. (1) open
   (2) Torus Spray

B. (1) closed
   (2) Torus Spray

C. (1) open
   (2) Drywell Spray

D. (1) closed
   (2) Drywell Spray

45. Unit Two was at 95% power when a loss of feedwater heating occurred. Following the transient, reactor power is 97%.

Which one of the following completes both statements below?

Thermal limits cannot be verified to be within the limits specified in the COLR when Final Feedwater Temperature is first reduced below __(1)__.

The most limiting thermal limit for loss of feedwater heating is __(2)__.

(Referenced Provided)

A. (1) 418.7°F
   (2) APLHGR

B. (1) 418.7°F
   (2) MCPR

C. (1) 319.3°F
   (2) APLHGR

D. (1) 319.3°F
   (2) MCPR

46. The Shift Manager has determined that Control Room evacuation is required. The RO has inserted a manual scram and placed the Mode Switch to Shutdown.

Which one of the following completes both statements below IAW 0AOP-32.0, Plant Shutdown From Outside Control Room?

The **next** Immediate Operator Action is to __(1)__.

IAW Attachment 17, Study of Manpower Needed and Sound Powered Phone Stations, a minimum of __(2)__ persons are required for a dual unit control room evacuation shutdown.

A. (1) Trip the Main Turbine
(2) 5

B. (1) Trip the Main Turbine
(2) 9

C. (1) Trip Recirc VFD A and B using the Emerg Stop pushbuttons
(2) 5

D. (1) Trip Recirc VFD A and B using the Emerg Stop pushbuttons
(2) 9

47. An unmonitored release from the Reactor Building is in progress and a hard copy Emergency Notification Form (ENF) is being completed IAW PEP-2.6.21, Emergency Communicator.

The following Met Tower Data is provided by the Process Computer:

Ambient Temp:	80 Deg F.
Upper Wind Direction:	18.00 Deg
Lower Wind Direction:	15.00 Deg
Upper Wind Speed:	8.00 MPH
Lower Wind Speed:	4.00 MPH
Stability Class:	D

Which one of the following completes both statements below?

The Wind Direction provided means that the wind is blowing __(1)__ the degree of direction.

When completing a hard copy ENF, __(2)__ wind speed and direction should be used IAW Attachment 3, Guidance for Completion of ENF.

A. (1) to
   (2) lower

B. (1) to
   (2) upper

C. (1) from
   (2) lower

D. (1) from
   (2) upper

48. Unit Two is operating at rated power when the following alarms and indications are observed:

Time = 0:
UA-03 (2-4) *TBCCW Pump Disch Header Press Low* alarm seals in
TBCCW Pump 2A is running.
TBCCW Pump 2B has tripped (no light indications)
TBCCW Pump 2C is aligned and running on Unit One
TBCCW Discharge Pressure, TCC-PI-566-1 on XU-2, indicates 38 psig

Which one of the following completes the statements below?

At time = 2 minutes, the <u>first</u> action required IAW 0AOP-17.0, Turbine Building Closed Cooling Water System Failure, is to __(1)__.

The 2-TCC-TV-609, TBCCW Heat Exchange Outlet Temperature Control Valve, __(2)__ to provide maximum cooling to TBCCW.

A. (1) reduce Reactor Recirc flow to the 0ENP-24.5 limit
   (2) opens

B. (1) reduce Reactor Recirc flow to the 0ENP-24.5 limit
   (2) closes

C. (1) manually scram the reactor and enter 2EOP-01-RSP
   (2) opens

D. (1) manually scram the reactor and enter 2EOP-01-RSP
   (2) closes

49. With Unit Two at rated power, the following alarms and indications are noted:

UA-01 (3-2) *Air Compr D Trip*	Alarm sealed in
UA-01 (4-4) *Inst Air Press Low*	Alarm sealed in
Air Compressor 2B	Running
Instrument Air header pressure	101 psig
Service Air header pressure	101 psig

Which one of the following is required IAW 0AOP-20.0, Pneumatic (Air/Nitrogen) System Failures?

The operator is required to:

A. close IA-PV-722-1 and IA-PV-722-2, Interruptible Air Isolation Valves.

B. open RNA-SV-5482 and RNA-SV-5481, Div I(II) Backup N2 Rack Isol Valves.

C. close SA-V8 and SA-V10, Inlet Isolation Valves To SA-PV-706-1/2.

D. open SA-PV-5067, Serv Air Dryer 2A Bypass Pressure Control Valve.

50. Unit Two is operating at rated power and the containment is being vented IAW 2OP-10, Section 6.3.2, Venting Containment via SBGT.

routinely (no abnormal rise in drywell pressure)
BJC 12-15-15

Subsequently, the RPS MG Set trips.

Which one of the following completes the following statement?

The reason drywell pressure __(1)__ is because __(2)__.

A. rises; a Group 6 isolation occurred

B. rises; a Group 10 isolation occurred

C. remains the same; venting is unaffected

D. remains the same; drywell cooling is unaffected

51. Unit Two has just entered MODE 4. RHR Loop A is operating in Shutdown Cooling. DG3 is under clearance.

Subsequently, a Loss Of Off-Site Power occurs and a Shutdown Cooling flowpath cannot be reestablished.

Which one of the following completes both statements below?

A Shutdown Cooling flowpath cannot be reestablished due to loss of power to the __(1)__.

An allowable method for feed and bleed operation IAW 0AOP-15.0, Loss of Shutdown Cooling is __(2)__.

A. (1) 2E11-F008, RHR S/D Cooling Suction Isolation Valve - Outboard
   (2) Feed with CRD Pump 2B. Bleed by RWCU Reject.

B. (1) 2E11-F009, RHR Shutdown Cooling Suction Isolation Valve - Inboard
   (2) Feed with CRD Pump 2B. Bleed by Maintaining RPV Level Using the Main Steam Line Drains.

C. (1) 2E11-F008, RHR S/D Cooling Suction Isolation Valve - Outboard
   (2) Feed with Core Spray Loop 2A. Bleed by RWCU Reject.

D. (1) 2E11-F009, RHR Shutdown Cooling Suction Isolation Valve - Inboard
   (2) Feed with Core Spray Loop 2A. Bleed by Maintaining RPV Level Using the Main Steam Line Drains.

52. Unit Two is performing refueling operations when the refueling SRO reports that a spent fuel bundle has been dropped in the cattle chute.
The following annunciators are in alarm on Panel 2-UA-3:

(2-3): *Rx Bldg Roof Vent Rad High*
(2-7): *Area Rad Rx Bldg High*
(3-7): *Area Rad Refuel Floor High*
(4-5): *Process Rx Bldg Vent Rad High*

Which one of the following is an Immediate Operator Action IAW 0AOP-5.0, Radioactive Spills, High Radiation, and Airborne Activity?

A. Enter 0EOP-04, RRCP

B. Isolate Reactor Building Ventilation.

C. Place Standby Gas Treatment (SBGT) trains in operation.

D. Ensure Control Room Emergency Ventilation System (CREVS) in operation.

53. Following a loss of feedwater on Unit One, HPCI initiated on low reactor water level then tripped on high reactor water level.

Current plant conditions are:

Reactor water level	150 inches, steady
A-01 (3-1) *HPCI Turb Trip*	alarm sealed in
A-01 (4-1) *HPCI Turb Trip Sol Ener*	alarm sealed in
A-05 (5-5) *Pri Ctmt Hi/Lo Press*	alarm sealed in
A-05 (5-6) *Pri Ctmt Press Hi Trip*	alarm sealed in
HPCI Initiation Signal/Reset white light	LIT
HPCI High Water Level Signal Reset white light	LIT

Which one of the following completes both statements below?

IAW A-1 (3-1), *HPCI Turb Trip,* the required operator action to commence HPCI injection to the reactor at this time is to __(1)__.

PCCP __(2)__ required to be entered.

A. (1) open 1-E41-F006, HPCI Injection Vlv
(2) is

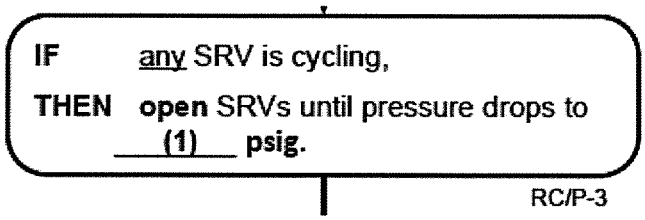
B. (1) open 1-E41-F006, HPCI Injection Vlv
(2) is NOT

C. (1) depress the High Water Level Signal Reset push button
(2) is

D. (1) depress the High Water Level Signal Reset push button
(2) is NOT

54. Following a MSIV closure on Unit One, RVCP is being executed. It is determined that SRVs are cycling.

Which one of the following completes both statements below?



The SRV opening sequence __(2)__ required while executing this step.

A. (1) 950
   (2) is

B. (1) 950
   (2) is NOT

C. (1) 1050
   (2) is

D. (1) 1050
   (2) is NOT

55. Unit One is operating at rated power. A Safety Relief Valve has failed open. Torus temperature is 96°F and rising.

Which one of the following completes the statement below?

IAW 0OI-37.8, Primary Containment Control Procedure Basis Document, __(1)__ torus water temperature reaches 110°F (Step T/T-6), Reactor Scram Required (Step T/T-7), to assure __(2)__.

A. (1) before
(2) torus temperature will remain in the safe region of the Heat Capacity Temperature Limit graph

B. (1) before
(2) reactor shutdown is attempted by control rod insertion before the requirement to initiate SLC is reached

C. (1) when
(2) torus temperature will remain in the safe region of the Heat Capacity Temperature Limit graph

D. (1) when
(2) reactor shutdown is attempted by control rod insertion before the requirement to initiate SLC is reached

56. A line break occurs in the Unit One Drywell with the following plant conditions:

RPV water level	180 inches steady on N026A/B, Wide Range Level
RPV water level	155 inches steady on N004A/B/C, Narrow Range Level
RPV water level	190 inches steady on N027A/B, Shutdown Range Level
RPV pressure	50 psig
Drywell ref leg temp	340°F
Drywell average temp	255°F
Reactor Building 50' temp	128°F

Which one of the following RPV water level indications are valid, if any?

(Reference provided)

A. None

B. N026A/B (Wide Range) **ONLY**

C. N026A/B (Wide Range) and N004A/B/C (Narrow Range) **ONLY**

D. N027A/B (Shutdown Range) and N004A/B/C (Narrow Range) **ONLY**

57. Following a LOCA on Unit Two, plant conditions are as follows:

Torus temperature	220°F
Torus pressure	10.5 psig
Torus level	- 43 inches
Core Spray (CS) Pump 2A Disch flow	5,000 gpm
RHR System B flow (2 pumps)	10,000 gpm loop flow (Torus Cooling mode)

BVC 12-15-15

Which one of the following identifies the ECCS pump(s), if any, that is (are) operating outside their associated NPSH limit?

(Reference provided)

A. Both RHR and CS are within NPSH limits.

B. Both RHR and CS are exceeding NPSH limits.

C. RHR is within NPSH limits. CS is exceeding NPSH limits.

D. RHR is exceeding NPSH limits. CS is within NPSH Limits.

58. Which one of the following completes both statements below concerning fuel zone reactor water level instruments (N036/N037)?

Jet pump flow will make fuel zone level instrumentation read __(1)__ than actual level.

Fuel zone level instruments __(2)__ valid with RHR LPCI flow.

A. (1) lower
   (2) are

B. (1) lower
   (2) are NOT

C. (1) higher
   (2) are

D. (1) higher
   (2) are NOT

59. While operating a rated power, a loss of Division I 250 VDC Switchboard 2A results in the following indications on Unit Two:

APRM readings:	16%
Control rods:	118 not full in
Blue scram lights:	137 illuminated

Given these conditions, which one of the following identifies a successful method of inserting control rods IAW Scram Immediate Actions or LEP-02, Alternate Control Rod Insertion?

A. Alternate Rod Insertion (ARI)

B. Scram Individual Control Rods

C. Reactor Manual Control System (RMCS)

D. De-energize Scram Solenoids and Vent Scram Air Header

60. A Site Area Emergency has been declared on Unit Two. Until the dose projection team arrives, the Control Room crew is performing 0PEP-03.6.1, Release Estimates Based Upon Stack/Vent Readings. Primary Containment Venting is in progress on Unit Two. The Main Stack flow instrument loop (2-VA-FT-3359) is not operational. The following conditions exist:

Main Stack Rad Recorder (2-D12-RR-4599):	3.8 E-2 µCi/cc
Total Unit 1 flow to Main Stack:	4450 cfm
Total Unit 2 flow to Main Stack	21400 cfm
Common systems discharging to Main Stack	AOG Bldg Exhaust RW Bldg Fan A

Which one of the following is the Source Term release rate estimation from the Main Stack IAW 0PEP-03.6.1?

(Reference attached)

A. 3.8 E-2 µCi/sec

B. 3.8 E+5 µCi/sec

C. 1.2 E+6 µCi/sec

D. 1.5 E+6 µCi/sec

61. Which one of the following is the power supply to Air Compressor 1D?

A. 480 V Substation 1E

B. 480 V Substation 1F

C. 4160 V Bus 1C

D. 4160 V Bus 1D

62. Which one of the following completes the statements below?

The highest CSW system pressure that will auto start the standby CSW pump is __(1)__.

If pressure remains below this setpoint for at least __(2)__ , the SW-V3(V4), SW TO TBCCW HXS OTBD(INBD) ISOL, will reposition to their throttled positions.

A. (1) 40 psig
   (2) 30 seconds

B. (1) 40 psig
   (2) 70 seconds

C. (1) 65 psig
   (2) 30 seconds

D. (1) 65 psig
   (2) 70 seconds

63. Which one of the following completes both statements below?

The hydrogen concentration entry condition setpoint for PCCP is above __(1)__.

If RPS A is de-energized, and CAC-AT-4409, Division I Hydrogen/Oxygen Monitor, is required to be placed in service, then it __(2)__ be unisolated using CAC-CS-2986 (CAM Div I Isol Ovrd).

A. (1) 1.5%
   (2) can

B. (1) 1.5%
   (2) can NOT

C. (1) 3.9%
   (2) can

D. (1) 3.9%
   (2) can NOT

64. Unit Two is operating at rated power.
The control room receives the following fire alarms/reports:

0900 HP reports an acrid smell in reactor building
0901 RX (-)17 FT SD NCS NE CORNER
0902 RBAO reports fire in NCS -17 foot
0903 RO makes PA announcement for the fire and initiates fire alarm
0905 RX (-)17 FT SD NCS ABV LANDING

Which one of the following completes both statements below?

The Electric Fire Pump will auto start when system pressure first drops below __(1)__.

IAW 0PFP-013, General Fire Plan, a PA announcement stating the location of the command post __(2)__ required.

A. (1) 90 psig
(2) is

B. (1) 90 psig
(2) is NOT

C. (1) 105 psig
(2) is

D. (1) 105 psig
(2) is NOT

65. Unit Two is operating at 30% power when the following sequence of events occurs:

Time	Generator Frequency
1208	59.8 Hz
1212	59.2 Hz
1216	58.8 Hz
1218	58.3 Hz

Which one of the following completes the statements below?

Of the times listed above, UA-06 (1-2) *Gen Under Freq Relay,* will first be alarming at __(1)__.

Given the conditions above, at 1220, the operator is required to __(2)__, IAW 0AOP-22.0, Grid Instability,.

A. (1) 1208
   (2) trip the main turbine ONLY

B. (1) 1208
   (2) manually scram the reactor and then trip the main turbine

C. (1) 1216
   (2) trip the main turbine ONLY

D. (1) 1216
   (2) manually scram the reactor and then trip the main turbine

66. IAW AD-OP-ALL-1000, Conduct of Operations, which one of the following identifies the requirements for manipulating a valve that has no label?

The valve can be manipulated ONLY after its identity has been confirmed by a __(1)__; SRO approval __(2)__ required.

A. (1) controlled document
(2) is

B. (1) controlled document
(2) is NOT

C. (1) peer check
(2) is

D. (1) peer check
(2) is NOT

67. Which one of the following identifies when fuel movement must FIRST be suspended IAW FH-11, Refueling?

Suspension of fuel movement and notification of the Reactor Engineer is required if a SRM rises by a factor of _____ relative to the SRM baseline count rate.

A. two

B. four

C. five

D. ten

68. Which one of the following completes the following definition IAW 0EOP-01, Users Guide?

Minimum Number of SRVs Required for Emergency Depressurization: The number of SRVs __(1)__ which corresponds to a minimum steam cooling pressure sufficiently low that __(2)__ .

A. (1) (five)
   (2) the ECCS with the lowest head will be capable of making up the SRV steam flow.

B. (1) (five)
   (2) the clad temperature will not exceed 1800°F

C. (1) (seven)
   (2) the ECCS with the lowest head will be capable of making up the SRV steam flow.

D. (1) (seven)
   (2) the clad temperature will not exceed 1800°F

69. IAW 0ERP-Radiological Emergency Response Plan, which one of the following completes the statements below?

The facility that has the primary function to facilitate in-plant repairs is the __(1)__.

The primary location for this facility is the __(2)__.

A. (1) Technical Support Center
   (2) O&M Building

B. (1) Technical Support Center
   (2) Operations Training Building

C. (1) Operational Support Center
   (2) O&M Building

D. (1) Operational Support Center
   (2) Operations Training Building

70. Which one of the following identifies the bases for the Minimum Critical Power Ratio (MCPR) Safety Limit IAW Technical Specifications Bases 2.1.1, Reactor Core Safety Limits?

The MCPR Safety Limit ensures that:

A. the calculated changes in core geometry shall be such that the core remains amenable to cooling.

B. plastic strain of the cladding does not exceed 1% during all modes of operation.

C. the calculated total oxidation shall no where exceed 0.17 times the total cladding thickness before oxidation.

D. during normal operation and during Anticipated Operational Occurrences, at least 99.9% of the fuel rods in the core do not experience transition boiling.

71. Given the following excerpt:

CONDITION	REQUIRED ACTION		COMPLETION TIME
A. RCIC System inoperable.	A.1	Verify by administrative means High Pressure Coolant Injection System is OPERABLE.	Immediately

Which one of the following completes both statements below IAW Tech Specs?

The phrase 'by administrative means', requires __(1)__.

When "Immediately" is used as a Completion Time, the required action __(2)__.

A. (1) performing the TS Surveillance
   (2) must be completed within 15 minutes

B. (1) performing the TS Surveillance
   (2) should be pursued without delay and in a controlled manner

C. (1) examining logs or other information to determine if the components are out of service for maintenance or other reasons.
   (2) must be completed within 15 minutes

D. (1) examining logs or other information to determine if the components are out of service for maintenance or other reasons.
   (2) should be pursued without delay and in a controlled manner

72. Which one of the following identifies the significance of the yellow dot affixed to an annunciator window IAW 0OI-01.01, BNP Conduct of Operations Supplement?

The yellow dot means that the alarm:

A. is a nuisance alarm.

B. has its annunciator card removed.

C. has one or more of its inputs disabled.

D. is lit because its associated equipment is under clearance.

73. Following a large line break in the drywell, H2/O2 monitors have been placed in service. Plant conditions:

Drywell pressure	40 psig
Drywell hydrogen	2.5% (ERFIS)
Drywell oxygen	3.5% (ERFIS)
Torus hydrogen	1.4% (ERFIS)
Torus oxygen	3.5% (ERFIS)
Torus level	-36 inches

Based on the above conditions, which one of the following completes both statements below?

PCCP directs to vent and purge Primary Containment __(1)__.

IAW 0OI-37.8, PCCP Basis Document, venting from the __(2)__ is preferred.

A. (1) ONLY if ODCM release rate limits are not exceeded
(2) torus

B. (1) ONLY if ODCM release rate limits are not exceeded
(2) drywell

C. (1) and exceed offsite radioactivity release rates if necessary
(2) torus

D. (1) and exceed offsite radioactivity release rates if necessary
(2) drywell

74. Which one of the following completes both statements below?

The Drywell High Range Area Radiation Monitors are designed to measure __(1)__ radiation.

These instruments are used to provide __(2)__.

A. (1) gamma
   (2) an entry condition into RRCP, Radioactivity Release Control Procedure

B. (1) gamma
   (2) estimates of core damage

C. (1) neutron
   (2) an entry condition into RRCP, Radioactivity Release Control Procedure

D. (1) neutron
   (2) estimates of core damage

75. In preparation for a valve manipulation in the drywell, the applicable RWP indicates that the highest dose rate in the area is 350 mR/hr.

A flashing red light is encountered at the entry location to the valve in the drywell.

Which one of the following completes both statements below?

The flashing red light indicates the area is a __(1)__.

This RWP __(2)__ be used to perform the valve manipulation.

A. (1) High Radiation Area
   (2) can

B. (1) High Radiation Area
   (2) can NOT

C. (1) Locked High Radiation Area
   (2) can

D. (1) Locked High Radiation Area
   (2) can NOT

Deleted RSS 1/7/2016 per 2014

RO Written Exam Reference Index

1. 0EOP-01-UG, User's Guide, Attachments 8 and 9

2. 0EOP-01-UG, User's Guide, Attachments 19, 20, 22, and 31 (Pages 1 and 2)

3. 0PEP-03.6.1, Release Estimates Based Upon Stack/Vent Readings, Attachments 1 and 6

4. 2OP-32, Attachment 4

5. COLR-U1-CYCLE-20 Power-to-Flow Maps